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STRENGTH OF WESTERN LARCH AND ITS SUITABILITY FOR POLES

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Data on the strength properties of small, clear specimens of virgin western larch from Montana and Washington have been available from early tests of the U. S. Forest Service. More recently, similar tests of western larch from British Columbia, made by the Canadian Forest Products Laboratories, showed considerably higher results, although there was no reason to believe there were any important differences in climatic or growth conditions.

A consideration of the whole problem indicated that the tests made in the United States about 40 years ago probably were not fully representative of the main body of western larch available or now being produced. That this view was justified is borne out by the results of recent extensive tests[2] that showed substantially higher strength in most properties of old-growth western larch than was obtained in the early tests. The recent studies also showed some difference between the strength of second-growth and old-growth trees, with the younger trees slightly stronger, on the average, than the old-growth material.

Comparative Properties

Figure 1 shows a number of the important properties of western larch in comparison with those of a few other high-density softwoods. The lengths of the bars represent composite average values for each species and property calculated from the more important test results obtained from small, clear specimens of wood both in the green and dry condition. The revised values for western larch are taken as 100 points and are represented by the solid bars.

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[1] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

[2] Acknowledgment is made to the Northern Rocky Mountain Forest and Range Experiment Station for extensive field work involved in the collection of test material.

The presence of defects will, of course, influence the strength of all species of wood, but, for grades having comparable defects, approximately the same relative comparisons among species may be expected as are indicated here for the clear wood.

Western Larch as a Pole Species

On the whole, the charts in figure 1 show that the revised values for western larch result in a higher comparative rating than was given by the earlier tests, although still somewhat lower in most cases than is obtained from the Canadian material. As may be seen in the charts, shock resistance and stiffness, which are highly desirable in poles, are the strength properties that show the greatest increase as a result of including the new data.

The position of western larch for use in pole line construction was improved considerably in 1948 when the American Standards Association approved a revision of their specifications for wood poles (AS 05.1-1948) in which the design fiber stress of western larch was established as 8,400 pounds per square inch. It is evident, however, that there are many factors other than strength that will affect the utilization of western larch, in common with other pole species, even though impetus may be given to its use by assignment of a high design stress.

The original strength properties of any pole will not be retained, nor will a pole give satisfactory service, unless the wood is either naturally resistant both to decay and harmful insects or can be protected satisfactorily by preservative treatment. The heartwood of western larch is intermediate in decay resistance and, like other species whose heartwood is intermediate in decay resistance, the poles require preservative treatment if they are to perform in accordance with life expectancies and standards required by public utilities and other consumers. The heartwood of larch, like other pole species, is more difficult to treat than the sapwood, and since larch is classified as a thin sapwood species, the depth of penetration of the preservative is limited. To meet the minimum penetration requirements of standards on preservative treatment, it is necessary to avoid excessive shaving of the poles. Larch seasons slowly; hence, care should be taken to season poles thoroughly before treatment to avoid deep checking after treatment that may expose untreated wood to infection.

Availability a Factor in Use for Poles

Current interest in the use of various western species for poles results from a number of factors, some of which date back 30 or more

years.[3] [4] [5] Foremost of these factors is the demand of users for a longer service life of poles to the end that even species with naturally high decay resistance now receive some form of preservative treatment. Following World War I it became apparent that the rapidly increasing number of poles needed could not be supplied from species naturally high in decay resistance. It became necessary, therefore, to meet the demand for poles by using species of lower decay resistance for which preservative treatment is even more necessary.

While the field for the use of various softwood species previously ignored was thus opened, the concentration of pole production naturally fell in those areas where timber was readily available, demand was greatest, and transportation of the poles to the user involved the least cost.

In the past few years, the extensive programs of rural electrification throughout the country have greatly increased pole requirements in all areas, particularly in the Central and Western States. That factor in the Western States has been coupled with greatly accelerated population growth. In addition, there appears to be an increasing demand for larger poles, 40 feet and longer, although there is a definite feeling that poles in these classes are becoming more and more difficult to obtain from the species that have long been established as the predominant suppliers.

It is natural, therefore, that consumers are becoming more interested in the poles that can be produced in quantity and in large sizes from the forests of the Northwestern States. The fact that extensive additional pole-treating capacity in this area has been installed within the past few years is also of importance in the over-all picture.

The trend toward increased use of western species for poles, especially in long lengths, is likely to stimulate production of western larch poles in any case. It appears, therefore, that the higher test results obtained in the recent study of that species, and the assignment of a high design stress by the American Standards Association, may serve further to promote the use of western larch poles.

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[3] Helphenstine, R. K., Jr. Quantity of Wood Treated and Preservatives Used in the United States in 1916. American Wood-Preservers' Association Proceedings, 1917.

[4] Anderson, I. V. Trends in the Utilization of Pole Species and Their Effect on Forest Management. Society of American Foresters Proceedings, 1947.

[5] Anderson, I. V. Pole-timber Supplies of the Northern and Far Western States and a Look at Production Problems. American Wood-Preservers' Association Proceedings, 1948.

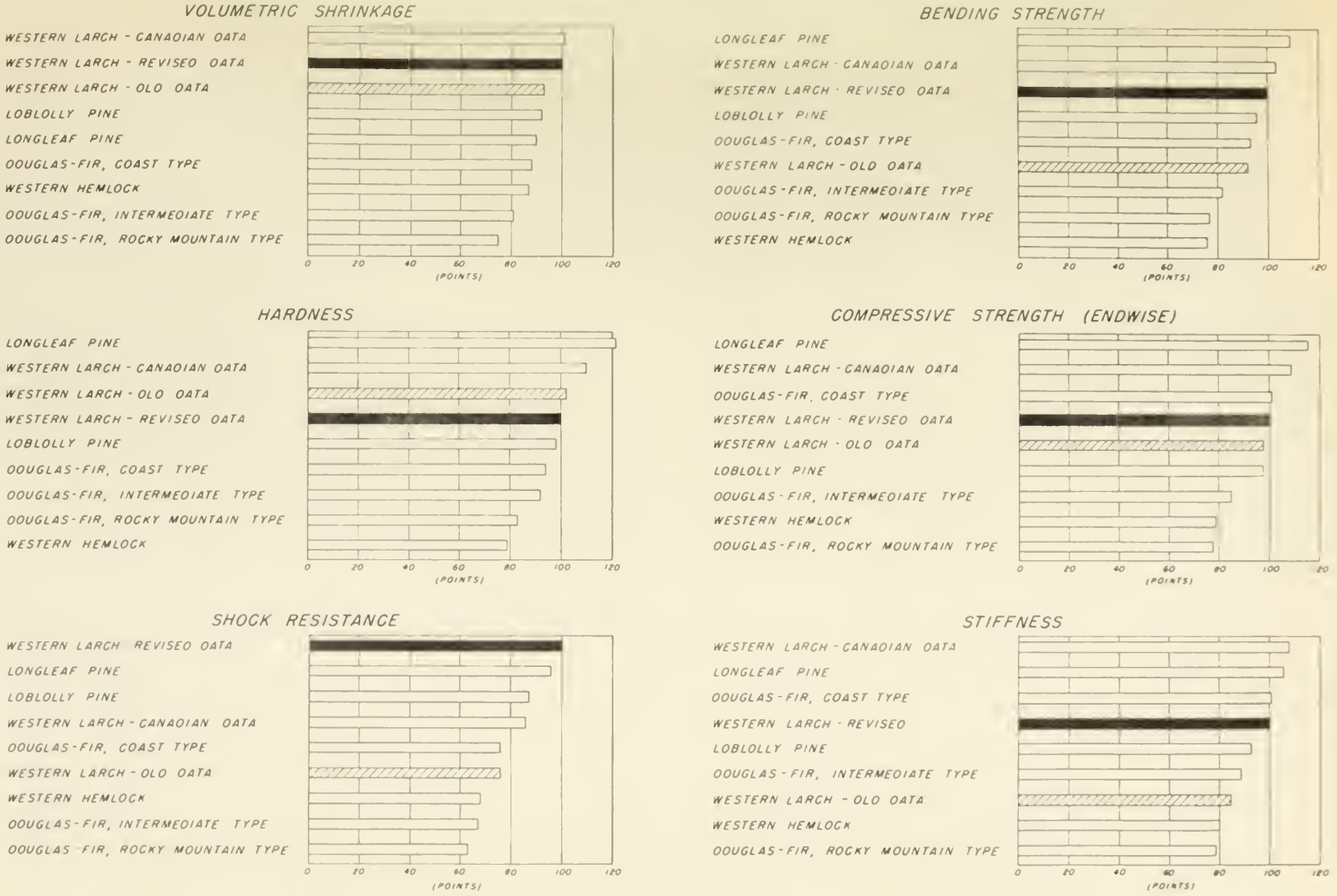

Figure 1.--Comparative strength properties of Western larch and a few other softwoods as determined from small, clear specimens.

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